MAGNETIC RESONANCE SPECTROSCOPY OF BREAST BIOPSY TO DETERMINE PATHOLOGY, VASCULARIZATION AND NODAL INVOLVEMENT

ABSTRACT OF THE DISCLOSURE

Robust classification methods analyse magnetic resonance spectroscopy (MRS) data (spectra) of fine needle aspirates taken from breast tumours. The resultant data when compared with the histopathology and clinical criteria provide computerized classification-based diagnosis and prognosis with a very high degree of accuracy and reliability. Diagnostic correlation performed between the spectra and standard synoptic pathology findings contain detail regarding the pathology (malignant versus benign), vascular invasion by the primary cancer and lymph node involvement of the excised axillary lymph nodes. The classification strategy consisted of three stages: pre-processing of MR magnitude spectra to identify optimal spectral regions, cross-validated Linear Discriminant Analysis, and classification aggregation via Computerised Consensus Diagnosis. Malignant tissue was distinguished from benign lesions with an overall accuracy of 93%. From the same spectrum, lymph node involvement was predicted with an accuracy of 95% and tumour vascularisation with an overall accuracy of 92%.